

In the Claims:

1. - 7. Cancelled

8. (Currently Amended) In a method of affecting cleaning to remove  $\text{AlF}_3$  residue from walls of a reactor chamber, the method comprising the steps of:

a) identifying cleaning process conditions of plasma containing  $\text{H}_2$  gases that maximize H-atom concentration in [[a]] said plasma of a gas mixture containing  $\text{H}_2$  and Ar using optical emission spectroscopy or actinometry to identify the H atom concentration in the plasma based on the relative emission intensity from excited H and Ar atoms by the formula:

$$\frac{\text{intensity of H}}{\text{intensity of Ar}} \sim \text{H atom } \underline{\text{concentration; concentration.}}$$

said cleaning process conditions including one or more of flow rate, pressure, and RF power;

b) subjecting said reactor chamber in situ to a gas mixture of  $\text{He}/\text{H}_2$  for striking a plasma then subjecting said reactor chamber in situ to  $\text{H}_2$  gas or a gas mixture of  $\text{He}/\text{H}_2$  according to the cleaning process conditions identified in step a) without opening said chamber and without shutting down said chamber to affect reduction and removal of said  $\text{AlF}_3$  residue.

9. Cancelled

10. (Currently Amended) A method of cleaning a chamber, the method comprising:
- determining cleaning process conditions that ~~maximizes~~ maximize H atom concentration in the chamber, the cleaning process conditions including one or more of flow rate, pressure, and RF power;
- injecting into the chamber a first gas mixture in accordance with striking process conditions, the first gas mixture comprising hydrogen and a first carrier gas;
- striking a first plasma from the first gas mixture, thereby creating a first plasma mixture;
- and
- injecting into the chamber a second gas mixture in accordance with the cleaning process conditions, wherein the second gas mixture comprises hydrogen,
- wherein the cleaning process conditions are different than the striking process conditions.
11. Cancelled
12. (Currently Amended) The method of claim 10, wherein the step of striking the first gas-~~mixture plasma~~ plasma is performed at a flow rate of about 1,000/200 sccm, at a pressure of about 0.8 Torr, and at an RF power of about 750 W for about 5 seconds.
13. (Previously Presented) The method of claim 10, wherein the chamber remains closed.
14. (Previously Presented) The method of claim 10, wherein the cleaning process conditions are determined to be a flow rate of about 500 sccm, an RF power of about 500 W, and a pressure of about 0.5 Torr.

15. (Previously Presented) The method of claim 10, wherein the step of determining cleaning process conditions is performed by using optical emission spectroscopy with an Ar tracer to determine the H atom concentration, the H atom concentration being determined by the formula:

$$\frac{\text{intensity of H}}{\text{intensity of Ar}} \sim \text{H atom concentration.}$$

16. (Currently Amended) The method of claim [[10]] 10, wherein the first gas mixture comprises a mixture of He and H<sub>2</sub>.

17. Cancelled

18. (New) The method of claim 8, wherein the striking the plasma is performed at a flow rate of about 1,000/200 sccm, at a pressure of about 0.8 Torr, and at an RF power of about 750 W for about 5 seconds.

19. (New) The method of claim 8, wherein the cleaning process conditions are determined to be a flow rate of about 500 sccm, an RF power of about 500 W, and a pressure of about 0.5 Torr.

20. (New) A method of cleaning a chamber, the method comprising:  
determining cleaning process conditions for hydrogen atoms in the chamber, the cleaning process conditions including one or more of flow rate, pressure, and RF power;  
injecting into the chamber a hydrogen-containing gas mixture;  
striking a plasma from the hydrogen-containing gas mixture; and  
injecting hydrogen into the chamber in accordance with the cleaning process conditions.
21. (New) The method of claim 20, wherein the step of striking the plasma is performed at a flow rate of about 1,000/200 sccm, at a pressure of about 0.8 Torr, and at an RF power of about 750 W for about 5 seconds.
22. (New) The method of claim 20, wherein the chamber remains closed.
23. (New) The method of claim 20, wherein the cleaning process conditions are determined to be a flow rate of about 500 sccm, an RF power of about 500 W, and a pressure of about 0.5 Torr.
24. (New) The method of claim 20, wherein the step of determining cleaning process conditions is performed by using optical emission spectroscopy with an Ar tracer to determine the H atom concentration, the H atom concentration being determined by the formula:
- $$\frac{\text{intensity of H}}{\text{intensity of Ar}} \sim \text{H atom concentration.}$$
25. (New) The method of claim 20, wherein the hydrogen-containing gas mixture comprises a mixture of helium and hydrogen.